

UNIVERSITY OF SWAZILAND
SUPPLEMENTARY EXAMINATION PAPER 2013/2014

TITLE OF PAPER: BIostatistics

COURSE CODE: B305

TIME ALLOWED: THREE (3) HOURS

- INSTRUCTIONS:**
1. ANSWER ANY FOUR QUESTIONS.
 2. EACH QUESTION CARRIES TWENTY FIVE (25) MARKS.
 3. ILLUSTRATE YOUR ANSWERS WITH LARGE AND CLEARLY LABELED DIAGRAMS WHERE APPROPRIATE.
 4. CLEARLY STATE YOUR NULL AND ALTERNATIVE HYPOTHESES AND YOUR CONCLUSIONS WHERE APPROPRIATE.

SPECIAL REQUIREMENTS:

1. CALCULATORS (CANDIDATES MUST BRING THEIR OWN).
2. GRAPH PAPER.
3. STATISTICAL TABLES (TO BE SUPPLIED BY THE LECTURER).
4. USEFUL EQUATIONS (TO BE SUPPLIED BY THE LECTURER).

THIS PAPER IS NOT TO BE OPENED UNTIL PERMISSION HAS BEEN GRANTED BY THE INVIGILATORS

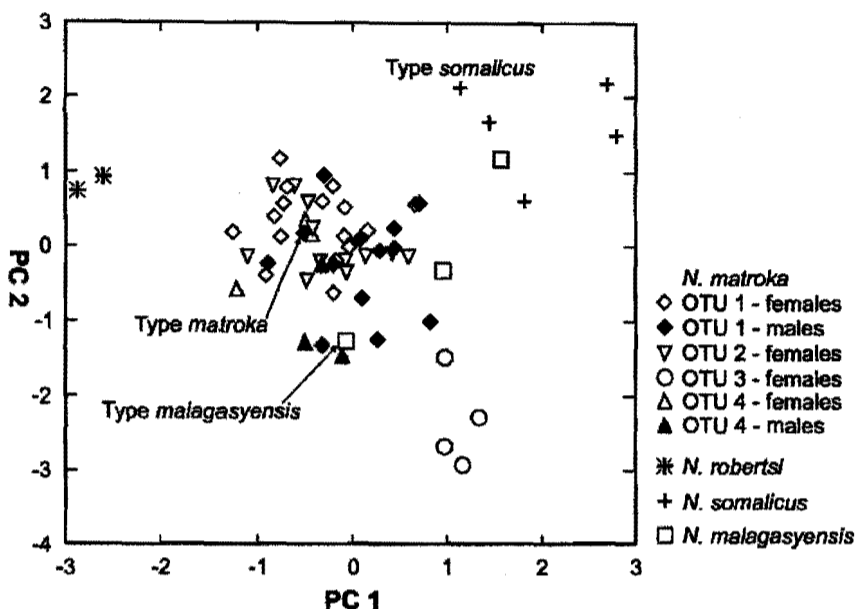
COURSE CODE B305 (S) 2013/2014

Page 2 of 5

ANSWER ANY FOUR (4) OUT OF SIX (6) QUESTIONS

QUESTION 1

Examine the following PCA chart (below). The names refer to 4 species of Malagasy bats.



The factor loadings on PC1 and PC2 are presented in the Table (below).

	PC1	PC2	PC3
Cranial			
GSKL	-0.961	0.123	0.128
CIL	-0.978	0.062	0.055
POB	-0.550	-0.760	0.251
MAST	-0.892	-0.172	0.015
PAL	-0.767	0.405	0.463
I-M ^f	-0.880	0.068	-0.325
C-M ^f	-0.924	0.175	-0.039
C-C	-0.892	-0.253	-0.131
M ^f -M ^f	-0.918	-0.135	-0.122
i-m ₁	-0.904	0.233	-0.145
Eigenvalue	7.652	0.962	0.457
Proportional sum of total explained variation	76.5%	86.1%	90.7%

Write an essay explaining what you can interpret from these data. Make sure to include a description of what PCA analysis is.

[TOTAL = 25 marks]

QUESTION 2

The following table shows results of a questionnaire conducted at two locations in Mozambique. At each location, seven homesteads were questioned about how many antelope they had poached in the past 6 months. The data do NOT meet the assumptions of parametric testing.

Number of antelope poached by homesteads		
Homestead	Location 1	Location 2
1	11	23
2	13	25
3	12	22
4	15	17
5	14	19
6	18	17
7	12	23

- a) Use an appropriate test to test whether poaching pressure is different at the two locations. Do NOT try to transform the data. [15 marks]
 - b) Provide detailed notes on why random stratified sampling is necessary, and how to conduct it. [10 marks]
- [Total = 25 marks]**

QUESTION 3

Refer to the table in Question 2 above (on poaching pressure in Mozambique).

- a) Present these data in a suitable graph. Make sure to calculate confidence intervals and add these to the graph. [20 marks]
- b) What are the assumptions of the Chi-Square test? [5 marks]

[TOTAL = 25 marks]

QUESTION 4

The following data were collected by an ecologist:

Leaf size (mm)	Age (months)
96	1.0
83	2.0
82	3.0
75	4.0
67	5.0
68	6.0

a) Calculate the slope and y-intercept for the best-fit straight line.

[15 marks]

b) Is this relationship significant?

[10 marks]

[TOTAL = 25 marks]

QUESTION 5

The data below were collected from people that were bitten by highly venomous snakes in south Asia.

Delay in getting treatment (hours)	Number of people that died (n = total number of people who were bitten)
6	12 (n = 99)
12	15 (n = 88)
18	12 (n = 60)
24	10 (n = 40)
30	9 (n = 16)

Is survival dependent on getting treatment? Use an appropriate statistical procedure to test this hypothesis.

[TOTAL = 25 marks]

QUESTION 6

- a) Write an essay on "How to write project proposals in Biology". Make sure to discuss in detail all the elements necessary in a good proposal.

[TOTAL = 25 marks]